

REMARKS

Claims 1-19 remain pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

CLAIM OBJECTIONS

Claim 14 stands objected to because of a formality. Applicant amends claim 14 in accordance with the Examiner's suggestion such that "dicing step dicing" now reads "dicing step for dicing". Accordingly, Applicant respectfully requests reconsideration and withdrawal of this objection.

REJECTION UNDER 35 U.S.C. § 102

Claims 1, 3, 5, 6, 8, 9 and 17-19 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Siniaguine (U.S. Pat. No. 6,664,129). This rejection is respectfully traversed.

Applicant amends Claim 1 to recite that the curved surface formation step includes using isotropic etching. Support for this amendment can be found on page 19, line 11 to page 20, line 11. The curved surface formation step curves the bottom surface of the hole portion while maintaining the width of the bottom surface in the hole portion substantially identical to the width of the opening portion. Applicant respectfully submits that Siniaguine fails to teach curving the bottom of a hole portion using isotropic etching.

Claims 3 and 17 depend from claim 1 and should be allowable for at least the same reasons as set forth above.

With respect to claim 5, the Office Action states that Siniaguine shows a manufacturing method for a semiconductor device comprising: a concavo-convex shape formation step for forming a concavo-convex shape (item 124c) on a part of the active surface side of the substrate on which the electronic circuits are formed; a hole formation step for forming hole portions by etching the area in which the concavo-convex shape has been formed, whose entire width is substantially equal to the width of the area on which the concavo-convex shape has been formed and whose bottom surface has a shape substantially identical to the concavo-convex shape; a connecting terminal formation step for forming the connecting terminals that serve as the external electrodes of the electronic circuits by burying metal in the hole portions; and an exposure step for exposing a part of the connecting terminals by carrying out processing of the back surface of the substrate.

Applicant respectfully submits that items 124C (FIG. 1) are not actually a concavo-convex shape (item 124c), but are merely bottom corners of the openings 124, and the alleged “concavo-convex shape” 124C is formed simultaneously with the sidewalls 124 in a single etching step when the openings 124 are formed, as disclosed in column 2, lines 17 to 31, of Siniaguine. Since the “concavo-convex shape” of Siniaguine are merely bottom corners of the openings, the location, the dimension, the number, and particular configuration thereof cannot be controlled.

On the other hand, the concavo-convex shape of claim 5 is formed in multiple steps, including formation of the masks 30 (see FIGS. 7A to 12) provided inside the

openings and etching of the substrate 10. Therefore, any number of concavo-convex shapes having any dimension and configuration can be formed on any locations in the substrate. Siniaguine fails to teach or suggest the subject matter of claim 5, in which openings are formed after formation of a concavo-convex shape on a substrate.

Claims 6 and 18 depend from claim 5 and should be allowable for at least the same reasons as set forth above.

With respect to claim 8, the Office Action states that Siniaguine shows a manufacturing method for a semiconductor device comprising: a mask formation step for forming a mask having a plurality of holes (item 124) in the hole formation area set in a part of the active surface (item 10f) side of the substrate (item 110) on which the electronic circuits are formed; a concavo-convex shape hole formation step for forming hole portions whose entire width is substantially identical to the width of the hole formation area and whose bottom surface has a concavo-convex shape by etching the substrate through each of the holes formed in the mask using an etching method in which the holes widen slightly in the surface direction of the substrate; a connecting terminal formation step for forming connecting terminals that serve as the external electrodes for the electronic circuits by burying metal in the hole portions; and an exposure step for exposing a part of the connecting terminals by carrying out processing on the back surface of the substrate.

Applicant respectfully submits that the disclosed openings are formed not in a mask, but in a substrate, as disclosed in lines 18 and 19, column 2, of Siniaguine. Siniaguine fails to teach or disclose forming a mask having a plurality of holes.

Claims 9 and 19 depend from claim 8 and should be allowable for at least the same reasons as set forth above.

It should also be noted that the subject matter of claims 5 and 8 is advantageous in that the bonding strength increases because the concavo-convex shape provides a larger bonding area of the solder, and thereby it is possible to implement an improvement in reliability.

Accordingly, Applicant respectfully submits that claims 1, 3, 5, 6, 8, 9 and 17-19 are patentably distinct from Siniaguine.

REJECTION UNDER 35 U.S.C. § 103

Claims 11 - 16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Siniaguine in view of Ormond et al. (U.S. Pat. No. 5,521,125). This rejection is respectfully traversed.

Claims 11 and 12 depend from claim 1 and should be allowable for at least the same reasons as set forth above.

Claims 13 and 14 depend from claim 5 and should be allowable for at least the same reasons as set forth above.

Claims 15 and 16 depend from claim 8 and should be allowable for at least the same reasons as set forth above.

ALLOWABLE SUBJECT MATTER

The Office Action states that claims 2, 4, 7 and 10 would be allowable if rewritten in independent form. Accordingly, Applicant amends claims 2, 4, 7 and 10 to include the


limitations of the base claim and any intervening claims. Therefore, claims 2, 4, 7 and 10 should now be in condition for allowance.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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